



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/932,050	08/17/2001	Yoshinori Atsumi	09792909-5142	4510

26263 7590 03/29/2004

SONNENSCHN NATH & ROSENTHAL LLP  
P.O. BOX 061080  
WACKER DRIVE STATION, SEARS TOWER  
CHICAGO, IL 60606-1080

EXAMINER

DOVE, TRACY MAE

ART UNIT	PAPER NUMBER
----------	--------------

1745

DATE MAILED: 03/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/932,050

Applicant(s)

ATSUMI ET AL.

Examiner

Tracy Dove

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 4-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 4-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/20/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

This Office Action is in response to the communication filed on 10/10/03. Applicant's arguments have been considered, but are not persuasive. Claims 1 and 4-26 are pending. Claims 2 and 3 have been canceled. This Action is made **FINAL**, as necessitated by amendment.

#### ***Claim Objections***

Claim 1 is objected to because of the following informalities: "prepared by sintering a carbon a material" should recite "prepared by sintering a carbon material". Appropriate correction is required.

Claim 12 is objected to because of the following informalities: " $1 \leq y \leq 2$ ", should be " $1 \leq y \leq 2$ ". Appropriate correction is required.

#### ***Double Patenting***

Applicant is advised that should claims 7 and 8 be found allowable, claims 10 and 11 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Applicant is advised that should claims 5 and 9 be found allowable, claims 12 and 13 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 4-13 and 19-26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 4, 5, 7, 10 and 12 recite " $0 \leq x \leq 2$ ", however,  $x = 0$  is not supported by the specification as filed.

Claims 10-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claims recite "average particle diameter", which is not supported by the specification as filed.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 1745

Claim 4 recites “said anode is a molded body comprising a material selected from the group consisting of an active material, a conductive agent, and mixtures thereof”, which indicates the anode may be made from a conductive agent alone. However, it is unclear how the anode dopes/undopes lithium if it is made for a conductive agent alone.

Claim 5 recites “said active material comprising  $\text{Li}_x\text{Fe}_y\text{PO}_4$ ”, which is improper. It is unclear which “active material” of claim 4 is being further limited.

Claim 6 recites “wherein said anode comprises at least one”, which should recite “wherein said anode active material comprises at least one” in accordance with the specification. Specifically, the materials listed in claim 6 are termed anode active materials in the specification.

Claims 7 and 10 recite the limitation “said active material” in lines 1-2. There is insufficient antecedent basis for this limitation in the claims.

Claim 7 improperly broadens claim 1. Specifically, the range of  $x$  in claim 7 is broader than the range of  $x$  in claim 1.

Claim 10 improperly broadens claim 1. Specifically, the range of  $x$  in claim 10 is broader than the range of  $x$  in claim 1.

Claim 12 recites “said active material comprising  $\text{Li}_x\text{Fe}_y\text{PO}_4$ ”, which is improper. It is unclear which “active material” of claim 4 is being further limited.

Claim 19 recites “said active material”, which is improper. It is unclear which “active material” of claim 4 is being further limited.

Claim 20 recites “said conductive material” in lines 1-2. There is insufficient antecedent basis for this limitation in the claims. The claims should recite “said conductive agent” and

Art Unit: 1745

recite whether the claim is limiting the conductive agent of the cathode or the conductive agent of the anode.

Claims 21 and 22 recite improper group language. Members of a Markush group are species of a single genus. Since metals and semiconductors are not the same genus, the claims are improper. See MPEP 2173.05(h).

Furthermore, the specification describes the materials of claims 6 and 20-22 as an active material for the anode. Thus, since the materials of claim 20 form an alloy or compound with lithium it is unclear how lithium is doped/undoped as required by claim 4. Furthermore, carbon is not a metal or a semiconductor material.

To the extent the claims are understood in view of the objections and rejections above, note the following prior art rejections.

#### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 4, 6, 19-21 and 23-26 are rejected under 35 U.S.C. 102(b) as being anticipated by Koichiro, JP 09-171827.

Koichiro teaches a non-aqueous lithium secondary battery having a positive electrode, a negative electrode and a non-aqueous electrolytic solution. The positive electrode includes an active material compound represented by  $\text{Li}_x\text{Fe}_2\text{PO}_4$  wherein  $0 < x \leq 1.0$ . The active material may include a binder and/or conductive agent (abstract). The negative electrode may be pyrolytic

Art Unit: 1745

carbon, graphite, coke or a calcinated carbon material (0019). The positive electrode is produced by carrying out pressurization molding (0027). The negative electrode is produced by pressing/molding (0030). The negative electrode may contain titanium dioxide. The non-aqueous electrolytic solution contains a solvent such as propylene carbonate and a salt such as  $\text{LiClO}_4$  (0020-0021).

Thus the claims are anticipated.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 4-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamauchi et al., US 5,705,296 in view of Moriguchi et al., US 6,576,369 and further in view of Goodenough et al., US 5,910,382.

Kamauchi teaches a lithium secondary battery comprising a positive electrode, a negative electrode and an electrolyte wherein the positive electrode is composed of a lithium-cobalt phosphate positive active material. The lithium-cobalt phosphate is preferably  $\text{LiCoPO}_4$  (col. 4, lines 16-19) and the active material may comprise only  $\text{LiCoPO}_4$  (col. 4, lines 32-34). Transition metals besides cobalt such as Ni, Fe, Mn, Cr and V may be contained in the lithium-phosphate positive active material (col. 4, lines 42-44). The negative electrode may be a carbon material doped with lithium ion (col. 6, lines 15-23). The electrolyte comprises a electrolytic salt and a nonaqueous solvent (col. 7, lines 45-60). The positive electrode may comprise at least the

Art Unit: 1745

lithium-transition metal phosphate active material, an electrical conducting agent and a binder (col. 4, lines 61-65). The mixture is blended and formed into a positive electrode having desirable shape and size by a known method such as compression molding (col. 5, lines 18-22). The carbon active material of the negative electrode is mixed with a binder and formed into a carbon negative electrode of a desirable shape and size by compression molding (col. 7, lines 40-44). The positive active material has an average particle size of 0.01-20  $\mu\text{m}$  (col. 2, lines 47-66). The carbon material of the negative electrode may be graphite (col. 7, lines 38-39). The electrolyte solution includes a solvent and a salt. The salt may be  $\text{LiClO}_4$  and the solvent may be propylene carbonate (col. 7, lines 45-60).

Kamauchi does not explicitly teach the carbon negative electrode comprises a sintered carbon material.

However, Moriguchi teaches a lithium secondary battery having an anode comprising a graphite (carbon) material. A conventional method is used to produce the negative electrode of Moriguchi. As employed in prior art lithium secondary batteries, a graphite powder is applied to a metal base serving as a current collector with the aid of a suitable binder and is shaped thereon. Alternatively, a sintered electrode may be produced from the graphite powder without use of a binder. Thus, the negative electrode may be comprised predominantly or solely of the graphite powder (col. 15, lines 31-39).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Moriguchi teaches it is conventional to produce a sintered graphite material anode without use of a binder. One of skill would have been motivated to use a the conventional sintered graphite anode of Moriguchi as the anode for the



Art Unit: 1745

lithium battery of Kamauchi because the prior art teaches such anodes are well known for use in lithium batteries. Moriguchi teaches both carbon electrodes formed with a binder, taught by Kamauchi, and sintered electrodes (without binder) are conventional methods for forming carbon negative electrodes for lithium batteries.

Kamauchi does have a specific example wherein the positive electrode active material is a lithium iron phosphate ( $\text{Li}_x\text{Fe}_y\text{PO}_4$ ).

However, Goodenough teaches cathode materials for secondary lithium batteries having the formula  $\text{LiMPO}_4$  wherein M is at least one first row transition-metal cation. M is preferably Mn, Fe, Co, Ti or Ni or a combination thereof. Preferred cathode materials include  $\text{LiFePO}_4$  and  $\text{LiCoPO}_4$  (col. 2, lines 12-34).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have been motivated to use the  $\text{LiFePO}_4$  positive active material of Goodenough for the  $\text{LiCoPO}_4$  (or lithium-transition metal phosphate) positive active material of Kamauchi because Goodenough teaches both positive active materials are known for use in lithium secondary batteries. Furthermore, Kamauchi clearly at least suggests the  $\text{LiFePO}_4$  positive active material compound. Kamauchi teaches transition metals besides cobalt such as Ni, Fe, Mn, Cr and V may be contained in the lithium-phosphate positive active material (col. 4, lines 42-44).

### ***Response to Arguments***

Applicant's arguments filed 10/10/03 have been fully considered but they are not persuasive.

The objection to the specification has been withdrawn.

Art Unit: 1745

Applicant argues Kamauchi does not teach or suggest a non-aqueous secondary cell wherein the positive electrode is comprised of lithium iron phosphate. Examiner disagrees with applicant because Kamauchi at least suggests a positive electrode active material containing lithium iron phosphate in column 4, lines 42-44. Kamauchi does not require any specific molar ratio of cobalt:phosphorus:lithium as asserted by Applicant. This is only an embodiment of Kamauchi and the reference is not limited to any particular embodiment. Kamauchi teaches transition metals besides (instead of) cobalt such as iron may be contained in the lithium phosphate active material. As pointed out by applicant transition metals such as iron may be added to lithium phosphate (page 10 of amendment). However, Goodenough is cited in combination with Kamauchi to teach the lithium iron phosphate limitation of the instant claims.

Applicant argues Kamauchi teaches an average particle size not a particle size as claimed. If Applicant is asserting every particle of the claimed lithium iron phosphate cathode material has the exact same particle size than it is suggested that a statement admitting such be submitted.

Regarding Moriguchi, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Moriguchi is not cited for teaching the cathode material. This limitation is taught by Goodenough and Kamauchi.

Applicant states Goodenough does not teach or suggest an anode comprising a sintered carbon material. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based

Art Unit: 1745

on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Moriguchi is not cited for teaching an anode comprising a sintered carbon material. This limitation is taught by Moriguchi.

All elements are taught by the combination of references (Kamauchi, Moriguchi and Goodenough). Applicant has not addressed the motivation provided by the Examiner for combining the references.

The instant claims are directed toward a known anode and a known cathode. Simply combining a known anode and a known cathode for a non-aqueous secondary battery is considered obvious. Contrary to Applicant's assertion, there is a reasonable expectation of success in combining a known anode and a known cathode for a non-aqueous secondary battery.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 1745

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

March 23, 2004

  
Patrick Ryan  
Supervisory Patent Examiner  
Technology Center 1700